

# **Technical Standards**



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Technical standards facilitate the transport of data from one environment to another. The detailed way in which they do this is normally invisible to the user. The complexity of music as a system of information makes the task of standards design arduous. There is a temptation to ignore what is difficult, especially if it is little used in commercial applications. In their role as computer users scholars need not be concerned with the details of standards implementations, but scholars are well qualified to judge the adequacy of proposed standards and are urged to report any concerns they have to the appropriate bodies.

### **MIDI File Format: Proposed Extensions for Representing Digital Sound**

The MIDI (Musical Instrumental Digital Interface) standard was developed to enable communications between electronic instruments and microcomputers. The Standard MIDI File format (ANSI X3V1.8M/88-6), developed in large part by Dave Oppenheim, was adopted in 1987. A description is available electronically from [archive-server@bartok.sun.com](mailto:archive-server@bartok.sun.com) and in hardcopy from the International MIDI Association, 5316 W. 57th St., Los Angeles, CA 90056.

The musical information that MIDI input can capture is limited to pitch and duration. The sophistication of musical information in the classical repertory is significantly greater than the signal-based information that MIDI interprets. This puts the impetus for refinement on the software developer.

In particular the information required to print music efficiently greatly exceeds what MIDI provides, both quantitatively and qualitatively. Kjell E. Nordli of the Department of Informatics at the University of Norway has proposed that MIDI Files could become a powerful "language" for a more general description of notated music if these files were extended to include certain kinds of additional information. His proposal includes extensions in several areas. We provide here representative items from selected lists.

#### **Enharmonics**

The Standard might be extended to provide for optional enharmonic specification in cases in which the sounding note is ambiguous (F $\sharp$ /G $\flat$ ). The code "xx" indicates the start of such a meta-event. Where "sf" equals an enharmonic specification, the proposed extensions are:

sf = 0: sharp  
 sf = 1: flat  
 sf = 2: double sharp  
 sf = 3: double flat  
 sf = 4: natural

### Dynamics

The code "cc" introduces the following dynamics meta-events:

cc = 0: start of crescendo  
 cc = 1: end of crescendo  
 cc = 2: start of decrescendo  
 cc = 3: end of decrescendo

### Accents

The code "aa" introduces the following accents (incomplete list):

aa = 1: tenuto	aa = 32: "sf"
aa = 2: staccato	aa = 35: "fz"
aa = 8: ">"	aa = 38: "sfz"
aa = 16: "^"	aa = 41: "rf"

### Clefs

To define clefs, three parameters are available. They are clef type ("cl"), clef position on the staff ("li"), and octave transposition ("oc"). The method is suggested by the following examples:

cl = 0: C clef	li = 1: bottom line	oc = 0: no transposition
cl = 1: G clef	li = 3: middle line	oc = -1: one octave down
cl = 2: F clef	li = 5: top line	oc = +2: two octaves up

The treble clef would be cl = 1, li = 2, oc = 0. An *ottava bassa* transposition of the bass clef would be represented as cl = 2, li = 4, oc = -1, and so forth.

Other matters that are addressed in the proposed file extensions concern differentiation of part- ("track"-) specific information from global variables (for example, where time signatures may not be the same from part to part), graduated dynamics, and slurs.

### SMDL: A Language for Music Documents

The American National Standards Institute committee on Musical Information Processing (MIPS), chaired by Charles Goldfarb, intends to issue a first draft of a proposed national Standard Music Description Language (SMDL) by the middle of 1991. The purpose of SMDL is to facilitate musical data interchange.

Over the past year the prospective standard has been divided into two projects. The time model that formed part of the original project, minus its provision for stress patterns, has been adopted as the basis for HyTime, a hyperdocument representation language with facilities for linking, anchoring, and synchronization. SMDL, which incorporates all other aspects of music description, has become one application of HyTime.

The MIPS secretariat is now located in Texas. The contact address is c/o Larry Austin, President, Computer Music Association, Box 1634, San Francisco, CA 94101-1634. Full texts of the draft standards for HyTime and SMDL can be requested as X3V1.8M/SD-7 and -8 respectively.

As a thesis project (M.S. in Computer Science), Neill Kipp at Florida State University has developed a program to convert SMDL documents to text file command sequences that can drive a synthesizer. The program consists of modules to facilitate lexical analysis, parsing, data structure managements, and output file generation. It is written in C.

To give some idea of what SMDL looks like, Neill Kipp and Steven R. Newcomb have provided a sample musical document description. Although only a two-bar sample is used, a general idea of the approach can be given. This representation is offered with several disclaimers. (1) Many options are available for SMDL representations. In the interest of brevity, neither the choices nor the reasons for making them are explained. (2) This example is relatively verbose because it is intended to be informative, but SMDL need not be so verbose. Standard Generalized Markup Language (SGML), a prototype document description language used for text representation, provides concise tags; a pre-parsed binary format is currently under development. (3) The line numbers do not form part of the document. (4) The indentation of elements is provided for clarity and has no other significance.

The symbolic grammar "<...>" opens an element, while "</...>" closes it. "Gam" = *gamut*, the menu of available pitches. The *baton* is the beat. The *thread* is the musical voice.

## Mary Had a Little Lamb



```

1  <work>
2
3  <bibdata>
4    <title>Mary Had a Little Lamb</title>
5  </bibdata>
6
7  <working class = excerpt>
8  <core>
9  <coredefs>
10 <pitchgam id = pitchgam>
11   gamutdes = "conventional 12-tone equal temperament"
12   highstep = 11
13   octratio = 2 1
14 >
15
16 <genfreq> -- sets gamstep 9 (= 'a') to be 440 Hz --
17   <gamstep>9</gamstep>
18   <freqspec><hertz>440</hertz></freqspec>
19 </genfreq>
20
21 <namestep>
22   <pitchdef><pitchnm>c</pitchnm><gamstep>0</gamstep></pitchdef>
23 </namestep>
24 <namestep>
25   <pitchdef><pitchnm>d</pitchnm><gamstep>0</gamstep></pitchdef>
26 </namestep>
27 <namestep>
28   <pitchdef><pitchnm>e</pitchnm><gamstep>0</gamstep></pitchdef>
29 </namestep>
30 <namestep>
31   <pitchdef><pitchnm>f</pitchnm><gamstep>0</gamstep></pitchdef>
32 </namestep>
33 <namestep>
34   <pitchdef><pitchnm>g</pitchnm><gamstep>0</gamstep></pitchdef>
35 </namestep>
36 <namestep>
37   <pitchdef><pitchnm>a</pitchnm><gamstep>0</gamstep></pitchdef>
38 </namestep>
39 <namestep>
40   <pitchdef><pitchnm>b</pitchnm><gamstep>0</gamstep></pitchdef>
41 </namestep>
42 </pitchgam></coredefs>
43 <baton id=baton1><tempo><musicdur><vtu>4</vtu></musicdur>
44 <realdur><rtu rtubase = 1200>4800</rtu></realdur></tempo>
45 </baton>
46

```

---

```

47 <thread id = thread1
48     baton = baton1
49     nominst = voice>
50 <ces pitchgam = pitchgam0>
51 <ce --( Ma- )-->
52 <musicdur><vtu> 1 2 </vtu></musicdur>
53 <note><nompitch><gampitch><octave> 2 </octave><pitchnm>e</pitchnm>
54 </gampitch></nompitch></note>
55 </ce>
56 <ce --( ry- )-->
57 <musicdur><vtu> 1 2 </vtu></musicdur>
58 <note><nompitch><gampitch><octave> 2 </octave><pitchnm>e</pitchnm>
59 </gampitch></nompitch></note>
60 </ce>
61 <ce --( had- )-->
62 <musicdur><vtu> 1 2 </vtu></musicdur>
63 <note><nompitch><gampitch><octave> 2 </octave><pitchnm>e</pitchnm>
64 </gampitch></nompitch></note>
65 </ce>
66 <ce --( a )-->
67 <musicdur><vtu> 1 2 </vtu></musicdur>
68 <note><nompitch><gampitch><octave> 2 </octave><pitchnm>e</pitchnm>
69 </gampitch></nompitch></note>
70 </ce>
71 <ce --( lit- )-->
72 <musicdur><vtu> 1 2 </vtu></musicdur>
73 <note><nompitch><gampitch><octave> 2 </octave><pitchnm>e</pitchnm>
74 </gampitch></nompitch></note>
75 </ce>
76 <ce --( tle )-->
77 <musicdur><vtu> 1 2 </vtu></musicdur>
78 <note><nompitch><gampitch><octave> 2 </octave><pitchnm>e</pitchnm>
79 </gampitch></nompitch></note>
80 </ce>
81 <ce --( lamb )-->
82 <musicdur><vtu> 1 2 </vtu></musicdur>
83 <note><nompitch><gampitch><octave> 2 </octave><pitchnm>e</pitchnm>
84 </gampitch></nompitch></note>
85 </ce>
86 </ces>
87 </thread>
88 <lyric thread = thread1>
89 <syllable>Ma-</syllable>
90 <syllable>ry</syllable>
91 <syllable>had</syllable>
92 <syllable>a</syllable>
93 <syllable>lit-</syllable>
94 <syllable>tle</syllable>
95 <syllable>lamb</syllable>
96 </lyric>
97 </workseg>
98 </core>
99 </work>

```

The *Journal of Technical Development*, which is available from the MIPS secretariat [address given on p. 54], provides extensive explanations of the coding and its purposes.

### TEI: The Text-Encoding Initiative

The Text-Encoding Initiative is intended to be to scholarly texts what SMDL is intended to be to music publications--a commonly accepted means of document markup that facilitates the interchange of texts in machine-readable form. The main objectives of the TEI are (1) to specify a common interchange format for text, (2) to provide guidelines for new text-encoding projects, (3) to document the major existing encoding schemes, and (4) to develop a metalanguage in which to describe them. Compatibility with existing standards, including Standard Generalized Markup Language (SGML), will be sought. The purpose of the interchange format is to specify how texts should be encoded so that they can be shared by different research projects and used for diverse purposes. The project is headed by C. M. Sperberg-McQueen. The first phase of the work, which has been funded by the National Endowment for the Humanities, the Commission of the European Communities, and the Andrew W. Mellon Foundation, culminated in a report that provided the basis for a one-day workshop at the ACH meeting in June 1990.

A provisional draft of the standard, *Guidelines for the Encoding and Interchange of Machine-Readable Texts* (1.0, August 1990) is available from Sperberg-McQueen at the Computer Center, M/C 135, University of Illinois at Chicago, Box 6998, Chicago, IL 60680, or from Lou Burnard, Oxford University Computing Service, 13 Banbury Road, Oxford OX2 6NN, England. Participation in an electronic discussion is possible through [LISTSERV@UICVM](mailto:LISTSERV@UICVM). To join the group send the message `SUBSCRIBE TEI-L <subscriber name>`. TEI's draft may be of interest to musicologists who are extensively involved with print-oriented computer projects involving significant quantities of such literary documents as poems, dramas, scripts, or letters. Contributions may be sent to [TEI-L@UICVM](mailto:TEI-L@UICVM).

To give the flavor of the approach, we have constructed a bibliographical citation. It has two parts--the citation record as it would normally be given [`<citn>`] and a tagged set of fields [`<citn.struct>`]. In the first, the title is identified in order to facilitate typographical differentiation. A prospective publisher would, upon encountering this specification, insert an appropriate command to make the title appear in his or her house style (italics, small caps, etc.). The tagged fields in the second part of the record could facilitate interchange of information with a relational database or support free searches for designated kinds of information.



```
<list.citn>
  <citn>Winton Dean and John Merrill Knapp,
    <title>Handel's Operas, 1704-1726, </title>
    (Oxford: Clarendon Press, 1987), 751 pp.
  </citn>

  <citn.struct>
    <authors>Winton Dean and John Merrill Knapp
    <title>Handel's Operas, 1704-1726
    <imprint>
      <publ. city>Oxford
      <publisher>Clarendon Press
      <publ. date>1987
    </imprint>
    <detail>751 pp. </detail>
  </citn.struct>
</list.citn>
```

Bibliographical citations are discussed in Ch. 5 of the *Guidelines*.

SGML (ISO 8879) makes provision for treatment of diacriticals and some foreign alphabets. The topic of character representation is treated in Ch. 3. There are two lines of approach to the encoding of diacriticals. In one case, the diacritical is identified and a mark indicates the letter with which it is to be associated. In the other, a series of special alphabets storing particular letters with specific diacriticals is accessed. The first approach is adequate for modern European languages, where the alphabet is largely the same from language to language. The second is essential where the character set is distinctly different from country to country, as in ancient and oriental languages. One issue that has not been resolved by the group is whether to encourage a single approach to both sets of needs or to treat them differently.

## CD+M

Warner New Media, which was instrumental in creating the CD+I (compact disk interactive) and CD+Graphics standards, is currently involved in negotiations with Philips and Sony to promote the development of specific standards for CD+M, compact disk plus MIDI technology. The basic idea is that MIDI data could be extracted from a performance recorded on CD. This extracted data could be exported to MIDI instruments and to music publishing programs. In contrast to CD+I technology, which depends on intensive indexing of the CD, and CD+Graphics, which deals with bit-mapped images, CD+M poses significant copyright problems [there is a brief discussion of these on p. 132].

